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Better Than Mom's Apple Pie

Software Innovation Brings Comfort to Job and Life

by Gerry Bleau

Ah! The smell of mom's apple pie. The comfort of being at home relaxing – without worrying about whether or not you will get a call from work to come in and address an equipment failure. We spend a lot of our time at work –and the time we spend away from work we want to enjoy fully.

How good would it be if we only had an enterprise software system that really changed, for the better, the way we work and the way we care for our assets on a daily basis...

- A system that we could rely on to ensure there were no surprises for Maintenance and Operations in managing equipment reliability, performance and uptime?
- A system that helps prevent equipment failure, increase production and lower costs?
- A system that would assure us peace of mind to enjoy our personal time (and not be called in to work because an equipment failure)?
- A system possibly better than Mom's apple pie...

Managing a Data Intensive Process

The process of managing equipment performance and reliability is data-intensive. It takes a lot of brain power, muscle, and timely actions to ensure we prevent equipment failure and optimize performance with the goal of meeting the goals of the company – generally to increase production and lower costs for better business performance.

Is it conceivable that this process could possibly be controlled and managed with a software system? Yes. It's name is Ivara EXP, and it's got it all. Finally, a system that pulls it all together:

- consolidating and analyzing condition data to allow fast and accurate business decisions
- a common view of equipment health
- building reliability programs across the entire asset base with RCM and accelerated FMEA techniques
- rapidly implementing RCM and FMEA findings
- sustaining a proactive "living" program with ad-

vanced failure tracking and analysis, a living dashboard measuring and monitoring leading and lagging KPIs

If you think in broad terms of software systems, EXP is like the ERP system of managing the performance of your equipment. It's different than an EAM/CMMS system. In fact, EAM systems play a vital role in the reliability process. However, while EAM systems effectively support your efforts to plan, schedule, execute and follow up on maintenance work as well as account and report on maintenance costs, the process of managing the performance and reliability of equipment follows a distinct process with specific roles and responsibilities – and it needs to be supported by a system to manage the data that drives the decisions.

Consolidating Islands of Data

In most plants today, there are islands of maintenance data scattered throughout the company in OEM manuals, various condition monitoring systems, RCM binders, PdM databases, spreadsheets, checksheets and online sources.

Ivara EXP is a data consolidation tool, providing a common view of asset health by bringing together data from multiple sources, including multiple predictive technologies. If it is a given that the surveillance activities and condition monitoring points are critical, because they are directly related to failure modes with consequences, then there is value in having a tool which can consolidate thousands of activities and

Editors Note: We invited our good friends at IVARA to kick off the new monthly "Information Technology" editorial feature not only because we are big fans of EXP software and not only because IVARA supports us in bringing Uptime to you each and every month. We published this article with specific references to EXP in order to tell more people about what we think is the next phase in the evolution of maintenance and reliability information management. We did not want to make it generic. There are other unique software products that we will also be presenting to you in the coming months. In order to bring you the full impact of the capabilities of some of these new technologies - we have decided to allow product specificity - not as an endorsement - but to create an enhanced understanding of the rapidly changing landscape of Information Technology. Uptime is comfortable stepping out of the limited and traditional etiquette of magazine publishing and we hope you see the value in our decision. We certainly invite your feedback as we go.

points, paint a picture of asset health and display it in order to make informed maintenance decisions. Without it, the effort required to collate and correlate thousands of data points, identify trends and suggest the appropriate action would be extremely labor intensive and would almost certainly result in missed early warning signs resulting in failures.

The reliability team at San Onofre Generating Station (SONGS) integrates over 35 data sources into EXP. SONGS uses Ivra EXP to integrate their reliability processes and to support the implementation of AP-913 industry reliability guidelines. EXP analyzes their critical information, identifying degrading trends & potential failures. SONGS equipment performance analysis, which previously required hours, is now completed online in minutes with EXP. The systematic approach to assess equipment criticality in EXP means better prioritization of maintenance activities, not to mention that the engineers' equipment knowledge is captured for long-term use.

The Daily Routine Changed for the Better – Managing by Exception

Picture a tradesperson arriving at work in the morning and the first thing he does – rather than arguing about yesterday's unexpected failure – is review his equipment health dashboard. There is one new flashing alarm that needs to be addressed from the hundreds of data points last fed into the system, real-time from multiple sources.

The alarm indicates an early warning on a

pump, a slight leak (less than 1 drip per minute). It's not urgent, so he acknowledges the alarm until the next one comes in (in this case, at 5 drips per minute, the system automatically creates a work order in the EAM/CMMS to address the failure in a timely manner – no surprises).

Because of the integrated equipment condition data (Figure 1), he can easily look up the recent condition trends to determine the context and other factors that may be related to an alarm and then make an informed decision in responding to the alarm. Alarms can also be configured to respond automatically so human intervention is not needed for well understood situations.

Performance Analysis Built-In

Engineers no longer need to remember, or spend time repeating, manual calculations and complex algorithms. EXP performs the calculations and conducts the analysis automatically, presenting the results visually as flashing alarms.

Using multiple data points from various indicators, EXP analyzes the values of all indicators to determine overall health of the equipment, and identifies the recommended corrective action. The rules it applies can be very sophisticated, incorporating logical expressions, complex equations and engineering calculations. Complex rule-based failure modes become automatic and therefore timely – which is critical, especially where safety and environmental factors are at risk.

A work order is generated automatically, or the alarm acknowledged by Maintenance and an informed decision made based on the relevant information. EXP correlated this data into one information system that automatically initiates the right work at the right time.

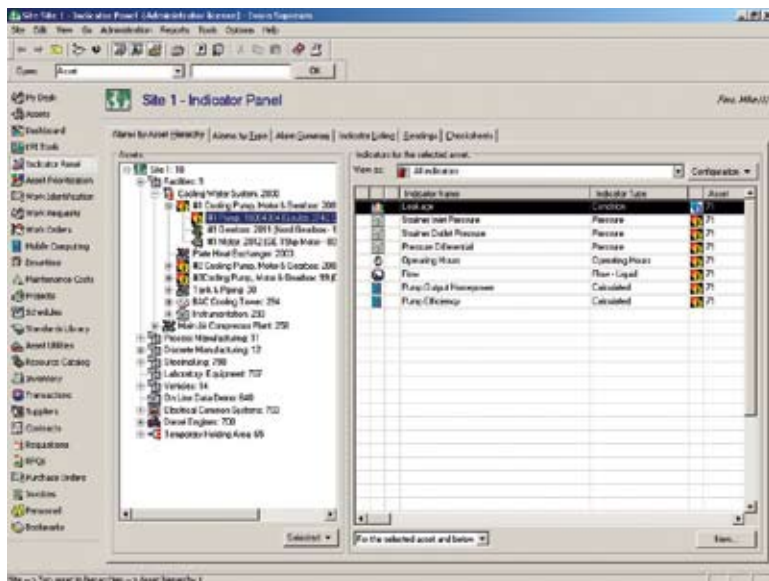


Figure 1 - Ivra EXP Asset Condition Indicator Panel

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The Ability to Implement RCM Findings

An understanding of how and why assets fail is essential in

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creating a maintenance program that is capable of avoiding unpredictable failure. We can no longer assume equipment fails on a time/age or usage based frequency. There is a common misconception that there is a connection between reliability and the age of an asset. This misconception led to the belief that the more often an asset is overhauled, the less likely it is to fail. This is rarely true in the real world, no matter how logical the concept sounds. The use of scheduled overhauls can actually increase the likelihood of failure by introducing more infant mortality into the system. So instead, we manage the indicators of equipment health and intervene before the asset reaches functional failure. A “good” tradesman today understands operating context and how that asset supports the business process. It’s difficult, if not impossible, without support of appropriate technology to predict when equipment will fail. Monitoring degradation in equipment condition reflects our new understanding of the way equipment fails, and our new definition of failure (functional failure - that is, not meeting performance requirement of the equipment).

RCM and Failure Modes Analyses (FMEA) have provided us with the know-how to identify

the minimum proactive tasks we need to perform to deliver the production requirements of our equipment. However, many organizations have experienced difficulty getting full value out of their RCM and Failure Modes Analyses (FMEA) efforts. Studies have shown that over 80% of analyses performed are not fully implemented, and one of the most significant hurdles is the ability to timely and effectively execute task recommendations from an analysis.

You can conduct RCM and FMEA analyses in EXP, but more importantly, EXP paves the way to implementing the task recommendations and manage a living program. Failure modes and task recommendations can be linked to assets and their condition indicators setup in EXP. Inspection tasks and routes can be quickly defined with a built-in wizard. Preventive replacement tasks, and advanced condition monitoring activities can also be defined in EXP ensuring that a complete maintenance program is in place to cover all the failure modes for each asset. EXP maintains the link between a task and the Failure Mode analysis from which it was determined (Figure 2), so it’s always possible to look back and understand why that task was needed.

Rapid Implementation

Ivara EXP is a rapid implementation tool, by virtue of its ability to template analyses across like assets while efficiently making operating context-specific adjustments in a controlled and auditable way. In a multi-site environment, its ability to leverage work done across multiple sites, means consistency in approach and implementation. Without EXP, it’s possible that much duplication of effort would be required, particularly in multi-site environments to enter and maintain maintenance program data. Most importantly, EXP makes all work completed at all sites part of a “living” maintenance program. Lessons learned and assumptions validated can be shared and updated across multiple sites. Without EXP, this sharing of experiences would be difficult to achieve.

At Domtar Paper’s Espanola Mill, reliability programs were developed and implemented for 90% of mill assets six months ahead of its original timeline using EXP.

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Best efforts without knowledge is just best efforts.

- W Edward Deming

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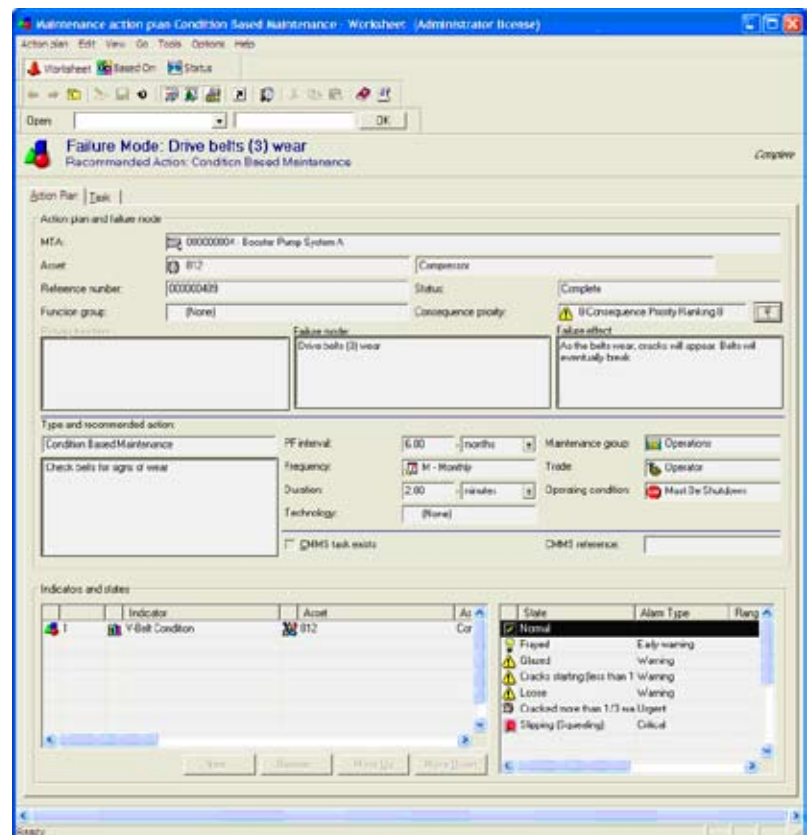


Figure 2 - Condition Based Maintenance Task and Associated Indicator States

provide further refinement and improvement to asset management practices using Ivara EXP. Weibull analysis can be applied to asset life and failure data within EXP to assess the nature of failure and to determine an optimum replacement interval for usage-dependent failure modes. Asset metrics can be calculated and compared across groups of assets to establish best-in-class benchmarks to identify opportunities for further improvement of laggard performers.

Complex industrial environments are in constant flux as changes in business conditions and modifications to the physical plant affect the operating context for assets. This often affects the maintenance activities required for the asset. For example, adding a stand-by pump can affect the criticality of an existing pump and hence allow for a different approach to maintaining it. With EXP, controlling the impact of these changes becomes manageable because the current maintenance tasks are linked to the original FM analysis used to identify them. Changes that may effect revision to the analysis can therefore be properly carried forward to make the appropriate changes to the current set of maintenance tasks. This achieves the elusive goal of a true “living RCM” program.

Sustainability of a Program tied to System Support

Sustainability of any maintenance program over time is tied to the ability to validate, revisit and improve upon the original assumptions made. Ivara EXP ties your data collection activities to the original failure mode analyses which defined their importance and determined the impact of potential failure. EXP is a platform for the execution of a proactive “living” maintenance program. It gives the program life and safeguards the original investment in time and effort, because it is constantly being revisited. Without EXP, the original investment in RCM or FMEA is difficult to sustain and the maintenance program can become quickly bypassed and ignored.

Failure Tracking and Analysis

Today’s maintenance and reliability professional needs the ability to record and analyze not only failures that have occurred, costs and the lessons learned, but also the ability to record and analyze avoided failures and the resulting failure avoidance savings. Failure analysis is a key component of continuous improvement and the “living” maintenance program. Without EXP, avoided

failures and the real successes directly attributable to the reliability improvement effort are difficult to quantify and the tracking of actual failures can be reduced to relying on codified information entered as part of the work order close process.

EXP provides automated tracking of asset downtime and the ability to differentiate between full, partial and potential failures. It can also track the early-warning signs that are effectively managed, catching impending failures before they cause real damage. In this way, it is possible to track the costs and benefits of failure avoidance (Figure 3), allowing the benefits of a proactive program to be monitored on an

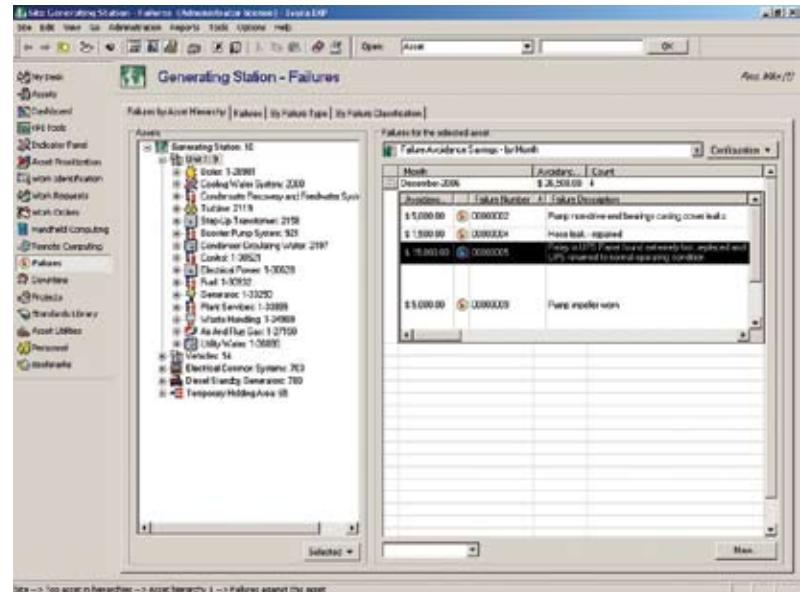


Figure 3 - Failure Avoidance Value Panel

ongoing basis.

KPI dashboards are built-in, but also highly configurable to support whatever business metrics are important to an organization. Asset level metrics such as OEE, downtime, maintenance costs, and failure metrics like MTBF, MTBR and MTR are tracked and fed

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back into the reliability program for further analysis and improvements (Figure 4).

Bottom Line Results

While the quality of life improvements for operations using Ivra EXP is “better than mom’s apple pie”, the bottom line improvements are the real win for the company.

- In the first nine months of using the Ivra solution at Dofasco Steel’s galvanizing line, the company achieved a 14% improvement in asset utilization, producing an additional 5600 tons per month of throughput.
- Domtar Paper achieved a 5% improvement in overall pulp mill efficiency while reducing costs by 30%.
- Cadbury Adams improved OEE (overall equipment efficiency) by 22%, surpassing its original target of 12% improvement.

Ivra EXP users are believers in a reliability process, creating a repeatable and sustainable approach to proactive maintenance. These believers are reaping the benefits — both personally and in company-level results.

And, although very close, that just might be better than mom’s apple pie...

Gerry Bleau is the President and Chief Executive Officer of Ivra Corporation, the leading asset reliability software solution provider. Gerry brings more than 20 years of leadership experience to Ivra, with significant software industry expertise, both domestically and internationally. Past roles include CEO at Decision Dynamics (formerly Time Industrial), COO of TempoSoft, and Senior VP, J.D. Edwards. In December 2005, Gerry led Ivra’s acquisition of Aladon LLC, the company that commercialized the first Reliability

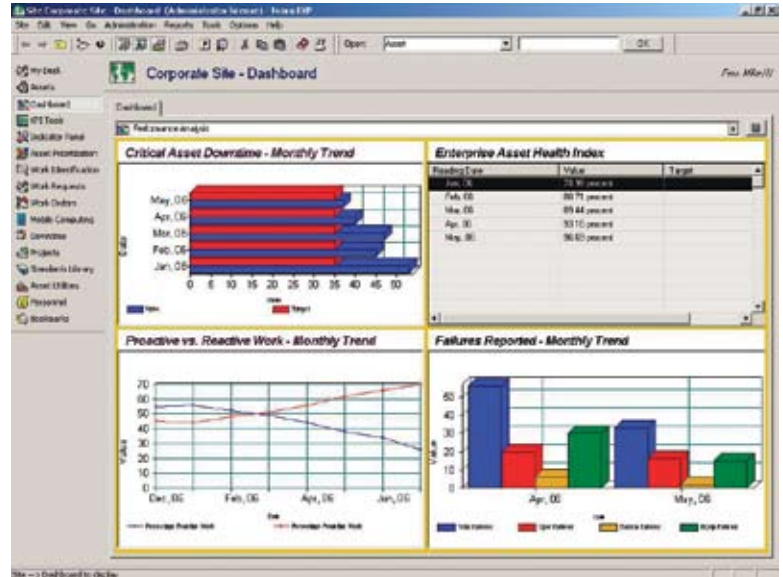


Figure 4 - Ivra EXP Equipment Health Dashboard

Centered Maintenance methodology, RCM2. Ivra’s global reach extends to over 80 countries through an alliance with members of The Aladon Network – a worldwide network of reliability solution providers that have a common link through Ivra RCM2 .

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